no more than two distinct faunas, the more southern including the countries and provinces bordering both sides of the Mediterranean, the other occupying the temperate regions of Germany, France, Britain, &c., the species diminishing in number as you proceed northward, and only a few extending into the Arctic Zone, from which there appears to be a total absence of any peculiar forms*.

It only remains for me to say that, although the results of my observations may differ materially from those arrived at by Mr. Jeffreys, I am by no means insensible to the obligations we are under to that gentleman for his valuable researches in the British seas, particularly in their remote northern limits, where dredging is a much more arduous occupation than in more genial climes or more sheltered situations.

XLIII.—*On* Paramecium ? coli, *Malmsten.*

By R. Leuckart†.

[Plate XVIII. figs. 12, 13.]

Under the above name Malmsten of Stockholm some time since described an Infusorial animalcule ‡ which occurs in the cæcum and colon of man, but had then only been observed twice, simultaneously with ulcers in the colon. In both cases it was present in innumerable quantities, and in the first case was to be found even after the healing of the ulcers, during the continuance of lientery; so that Malmsten is inclined to think that this latter disease might be referred to the parasitism of our Infusory. The description of the parasite, drawn up by Lovén, runs as follows:—

"The animal is cylindrical, oval, a little pointed anteriorly, broader or narrower according to the quantity of nourishment taken in, and narrower also when it moves through the mucus, turning continually upon its axis. Its length is about 0·1 mill. On the external membrane it has a dense coat of cilia, which stand in somewhat oblique series. In front, on one side of the apex, is the mouth furnished with long cilia; and the œsophagus, which is slightly dilated and somewhat curved, penetrates the interior to a considerable depth. In the interior parenchyma a dark streak sometimes indicates the course of a swallowed morsel.

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* Greenland is considered by many naturalists to form part of the same province with Northern Europe, and has a few peculiar land and freshwater shells; but their distinguishing characters are extremely slight.

† Translated from Wiegmann's Archiv, 1861, p. 81, by W. S. Dallas, F.L.S.

‡ Translated in Virchow's Archiv für pathol. Anat. und Physiol. 1857, vol. xii. p. 302, tab. x.

At the posterior extremity, a little towards the ventral side, lies the anus, which sometimes projects a little, is sometimes drawn in, and sometimes forms a passage, furnished with several windings, through the cortical layer. The contour of the nucleus is very faintly marked; it is of an elongate elliptical form, with now and then a median constriction, as if from the commencement of division. Two contractile vesicles are present. The larger one is situated quite posteriorly, close to the anal orifice; the smaller one about the middle of the dorsal side. The vesicles contract very slowly, and change their form considerably. In some individuals they were sought for in vain. Besides these parts, the animals showed in their interior a greater or less number of swallowed nutritive matters, generally more or less digested starch-granules and fat-drops."

The preceding is all that we have hitherto known about this parasitic Infusory; and I am therefore the better pleased that I can here communicate something new upon it. Not that I have been so fortunate as to observe a fresh case of its occurrence in man. Malmsten's cases still stand alone. But I have found exactly the same Infusory in the colon and cæcum of a domestic animal, and indeed so constantly and in such quantities as even to throw some light upon the possibility of its occasional transfer to man. The animal which harbours our Infusory is the pig. In order to observe it, all that is necessary is to draw forth, by means of a long sound, a little dung and intestinal mucus from the rectum and spread it under the microscope. Even with the simple lens the colourless animalcules may then be seen moving through the dung.

What I have established by my observations on these parasites of the pig is essentially confirmatory of the statements of Lovén and Malmsten. I have to contradict them only on one point; and this regards the formation of the mouth. For a long time I believed, with the Swedish observers, that our parasite has a *lateral* mouth, because during the ordinary swimming movements it is usually seen to lie to the right or left near the median line (fig. 12). But this circumstance can prove nothing, because the generally oval body in swimming (both forwards and backwards) continually revolves upon its axis, and consequently presents a median position of the mouth only during the short period of its passage through the median plane. Matters take a very different appearance, however, when we see the animal feed (fig. 13). When this business is going on it applies itself to the nutritive matter with the gaping buccal orifice downwards, and also creeps for some distance forwards with the margins of the buccal orifice, without any change in the position of the body. The two sides of the body then appear perfectly symmetrical, with the buccal funnel and œsophagus in the median line as in a bilateral animal; whilst in the lateral position of the mouth the outlines of the body present unequal curves, and the buccal funnel and œsophagus ascend asymmetrically towards the opposite surface of the body.

Under these circumstances I have no hesitation in explaining the structure of our animal in accordance with the conditions of the laterally symmetrical type, that is to say, in regarding the mouth as an organ of the median plane. The surface which bears it would then represent the ventral surface; and the opposite one would have to be regarded as the dorsal surface. The latter is on the whole more strongly arched; the former, at least in the vicinity of the mouth, is flattened.

If my view be correct, our parasite can of course no longer remain united with the genus *Paramecium* (to which it is with doubt referred by its discoverers), as this is distinguished by the lateral position of the mouth. Still less does it belong to the genus *Plagiotoma*, to which Claparède and Lachmann have recently referred it, as not the smallest trace of a spiral ciliary furrow exists in our animal. It might perhaps be best and most naturally placed in the genus *Holophrya*, if we decline for the present to establish a peculiar genus, until we know more of the allied forms (from the colon of the Horse and the paunch of the Ruminants, the latter of which has recently been described by Stein, under the generic name of *Isotricha*).

In the median position, the buccal orifice of our parasite appears as a triangular, gaping aperture, with an angle directed backward. The anterior side of this triangle belongs to the dorsal surface. It forms as it were a penthouse-like prolongation of this surface—an upper lip, which projects over the mouth and presses down on the ventral surface. The lateral sides or lips project inwards during repose in a curved form into the buccal cavity, whilst in feeding they diverge from the posterior angle. When engaged in feeding, therefore, the buccal orifice has a considerable width (as much as 0·012 mill.), and this the more, as the lips at this time project in a trumpet-like form.

The buccal orifice is followed by a cavity which gradually diminishes, like a funnel, and is at last drawn out into a narrow cylinder—the œsophagus. The buccal cavity, and especially the lips, are covered with cilia, which exhibit a very powerful and almost rotatory movement; they are perhaps twice as long as the hairs of the otherwise perfectly uniform ciliary coat, and force the food into the interior of the body. In the pig the nutritive matters consist chiefly of a finely granular detritus—rarely of starch-granules.

The cuticula, which covers the body and bears the cilia, is very tough and of considerable thickness, without any other marked characters. It lies upon a clear cortical layer, of no great thickness, which, on its part, encloses the finely granular medullary substance, sprinkled here and there with strongly refractive, small corpuscles. It is only at the anterior extremity, in the vicinity of the buccal orifice and œsophagus, that this cortical layer attains a greater thickness. Here a radiate marking is seen in it, as if a layer of diverging fibres was continued into the margin of the upper lip. Where the œsophagus approaches the granular medullary substance, the latter is drawn inwards, as if furnished with a shallow depression.

Of internal organs I observed, like Lovén, only a nucleus and contractile vacuoles. The former lies on the ventral surface, sometimes further forward, sometimes further back, near the median line. Its outlines are not very sharp; it is pale and finely granular, and of a longish form—not straight, but curved somewhat in the form of a horseshoe. The notion of a constriction is due to an optical illusion, caused by the adjustment of the microscope to the extremities of the nucleus. No nucleolus was discovered. Besides the two contractile vacuoles described by Lovén, a third is sometimes seen. I have not observed proper contractions in them, although there is no doubt that their contents change, and especially that they are sometimes so much dilated (up to 0·02 mill.) that they push up the external integuments in the form of a hump. On the other hand, however, I have made another astonishing observation on these structures, namely, that they force themselves in the form of drops through the surrounding parenchyma, and thus gradually wander from place to place.

The length of the Infusoria observed in the pig varies between 0·075 and 0·11 mill., usually amounting to 0·09 mill., with a breadth of 0·07 mill.

Their reproduction is unknown to me. Self-division was never witnessed. The only thing which might possibly indicate such phenomena was the occurrence, although but rarely, of spherically contracted unciliated individuals (as large as 0·11 mill.), of which the parenchyma possessed a tolerably uniform opake consistence, with the exception of a number of large oil-drops. The cuticle was thickened, and the buccal orifice could no longer be detected, although the anterior extremity of the body was still distinctly recognizable by the thickness of its cortical layer; the presence of the horseshoe-like nucleus and of the wandering vacuoles also left no doubt as to the origin of the body. I might almost suppose that the Infusoria in this form quit the intestine of their host in order to propagate externally (by repeated division ?), and finally to migrate again into its descendants.